HABITS AND HABITAT OF SOME COMMON SPIDERS FOUND IN WESTERN INDIA

BY

T. V. SUBRAHMANIAM

(*With sixteen text figures*)

The Tetragnathidae and Argiopidae, with which this paper deals, are two large families of orb-weaving spiders under Arachnomorphae. In these families we come across several interesting and curious genera which present great variation in size, shape, coloration and habits. Some species are so small that without a lens nothing can be made of them. On the other hand there is the well-known Giant Wood Spider (*Nephila maculata*) whose body length measures more than two inches. Most of the members weave plain, circular snares suspended vertically, obliquely, or horizontally among plants and shrubs or between branches of trees. These orb-webs vary considerably in size and make-up in the different genera. Some webs are small with a few radii and spirals; some are large, ornamented in the centre or along the radii with silken lace-work and zig-zag lines (*Argiope*); some have a diametrical line of debris (*Cyclosa*) and some are perfect domes with accessory reinforcements and suspensions (*Cyrtophora*). Some genera, e.g., *Araneus*, *Tetragnatha*, etc., are nocturnal in habits, whereas *Argiope*, *Cyrtophora*, *Nephila*, *Leucauge*, etc. remain in their webs permanently and get away from them only when disturbed. Then there are the forms like *Nephila* where sexual dimorphism (disparity in the size of sexes) is greatly pronounced. There are long-legged forms and short-legged ones. There are smooth-skinned, prettily coloured species and also those with hard integuments drawn into spines, tubercles and prominences. Altogether in view of such wide variations the collection of Tetragnathids and Argiopids is difficult in some cases and easy in others.

Under Tetragnathidae and Argiopidae the more important genera that are commonly found in Bombay and other districts in Western India (including Cochin and Travancore) are:—

TETRAGNATHIDAE

1. *Tetragnatha*
2. *Orsinome*
3. *Eucta*
4. *Leucauge*

ARGIOPIDAE

1. *Nephila*
2. *Argiope*
3. *Cyrtophora*
4. *Cyclosa*
5. *Araneus*
6. *Herennia*
7. *Ordgarius*
8. *Gasteracantha*

Tetragnathidae

Tetragnathids are moisture-loving spiders and in general structure and habits agree with each other. They are found in large numbers among plants and hedges especially on the vegetative growths fringing pools, tanks and wells and among grass and herbage growing in water-logged localities.

Genus *TETRAGNATHA*

The extraordinarily developed chelicerae, the cylindrical abdomen and the long, slender legs stretched fore and aft in linear fashion —help us to detect this genus. Members are generally nocturnal: the spider leaves its orb-web during the day and hides on the underside of a contiguous leaf or grass-blade. At dusk, however, it comes out of its hiding place, repairs and reinforces the web with fresh threads and occupies the centre.

There are about ten species of *Tetragnatha* recorded from India and the following are those commonly found in Cochin and other Western Indian districts:—

Tetragnatha gracilis Stolicz.
,, *mackenzieii* Gravely
,, *mandibulata* Walck.
,, *cochinensis* Gravely
,, *viridorufa* Gravely

The disposition of the eyes, the nature of the chelicerae and the arrangement of the spines over them vary widely in the different species and are of taxonomical value.

T. gracilis has its lateral eyes prominent and the fangs and mandibles comparatively short. The total length (carapace plus abdomen) does not exceed 12 mm. Members are common in jungles and even during the dry months of April and May they are found in large numbers on the withering twigs of garden plants. One peculiar habit of this species is that it constructs its web on either side of a small twig, the twig itself forming a diametrical reinforcement of the web (fig. 1). The colour of the spider invariably matches that

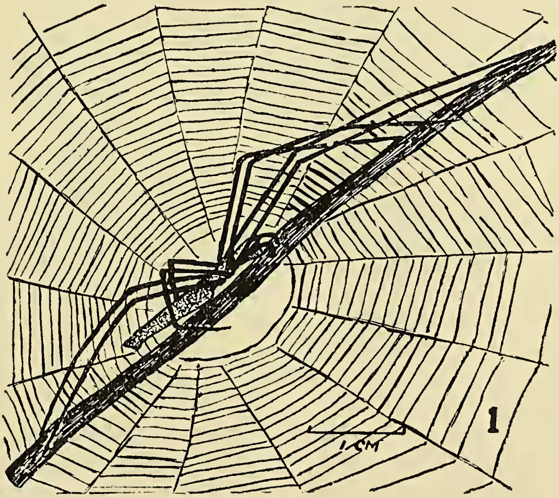

FIG. 1. *Tetragnatha gracilis.*

of the twig and it is difficult to spot the creature when it sits stretched along the twig. But as these spiders are chiefly nocturnal they are found very active towards sunset repairing the old or constructing new webs around the small terminal branches of plants. It appears that this species prefers plants with sparse leaves to those with thick foliage for the construction of the webs.

In *T. mackenziei* the abdomen is greyish and carapace and legs yellowish green.

T. mandibulata is another common species found on plants overhanging pools and tanks. Members generally hide under grass blades or along twigs, stretching their legs in the characteristic tetragnathid fashion. Fully grown specimens measure 13 mm. The fangs are well-developed and provided with two small teeth. The general colour is brownish yellow.

T. cochinensis has a slender but long body measuring about 12 mm.

T. viridorufa is a nocturnal species found among leaves and twigs of jungle trees. The abdomen is long and tubular, more or less squarish in cross-section. The sides of abdomen are coloured green whereas the dorsal side and legs are reddish brown. Males and females do not differ much in size. While mating they grasp each other by their chelicerae. The female tucks her abdomen towards her mate while the latter injects the sperms into her orifice applying his right and left palpal organs alternately during the act of copulation.

Genus *EUCTA*

Eucta javana Thorell is a common species found hiding under plantain leaves. It has a pair of weakly toothed chelicerae, long, slender legs and a very remarkable abdomen produced behind the spinnerets into a long tapering 'tail' (fig. 2). *Ariamnes similans* recorded from Calcutta[1] resembles *E. javana* in general shape and architecture but its tail and abdomen are of a prevailing green colour with silvery and yellowish brown markings. The general colour of *E. javana* is pale brown.

Genus *ORSINOME*

Orsinome marmorea Pocock is an interesting species resembling *E. javana* but with a rounded abdomen. In Cochin, members are commonly found in their horizontal webs attached to rocks by the side of fountains and streams. About the habits of these spiders Dr. Gravely gives the following account:—

'*O. marmorea* spins large and more or less horizontal webs between rocks above rapidly running streams at an altitude of about 1,500 ft. in the Cochin Ghats. Several webs are usually grouped together: often they are stretched above waterfalls. When the spiders are disturbed they fall into the water, which washes them away. When they reach a rock they cling to it, and remain an inch or two below the surface till danger is over. 'Males and females were sometimes found together in the middle of a web with their heads in contact. Presumably they were pairing but I had not time to investigate this fully'.

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[1] Biology of Spiders, T. H. Savory.

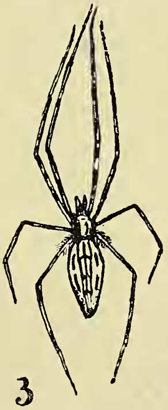
Genus *LEUCAUGE* (*ARGYROEPEIRA*)

Genus *Leucauge* like *Tetragnatha* includes several interesting species measuring 6 to 12 mm. in length. All of them possess a row of long hairs on the femur of the 4th pair of legs. The body is beautifully coloured with shining silver over a greenish black background. They are chiefly grass spiders building oblique or horizontal webs and sitting at the centre in an inverted position. They are mostly diurnal, and their mating habits are similar to those of Tetragnatha. Cocoons are long and egg shaped and are attached to leaf blades or leaves on which the spider sits.

The following species are recorded from India by Dr. Gravely:—

Leucauge fastigata (Simon)
,, *tessellata* (Thorell)
,, *celebesiana* (Walck.)
,, *ventralis* (Thorell)
,, *culta* (Cambr.)
,, *decorata* (Blackwall)
,, *bengalensis* Gravely

Of these the first four are fully described in the Fauna of British India. *L. fastigata* has its anterior end of the abdomen conically elevated whereas in *L. celebesiana* it is the posterior end that is conically produced beyond the spinnerets.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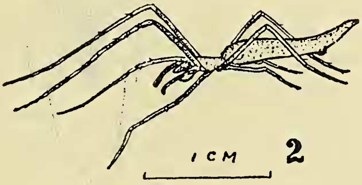

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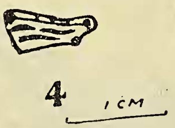

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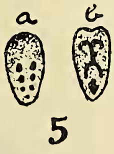

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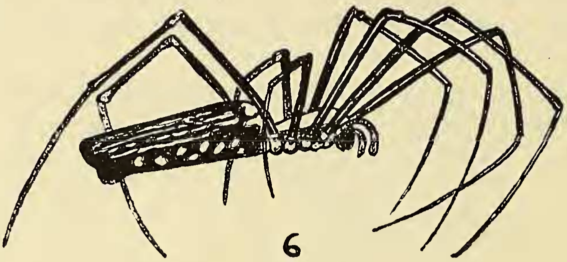
FIG. 2. *Eucta javana.* FIG. 3. *Leucauge decorata.* FIG. 4. Abdomen of *L. decorata.* FIG. 5. (*a*) Abdomen of *L. culta.* FIG. 5. (*b*) Abdomen of *L. bengalensis.*

In Bombay *L. decorata* is found in large numbers in shady places among bushes and herbage. The abdomen possesses a pair of shoulders or tubercles of black colour at the anterior end. The posterior end of the abdomen is also black. Rest of the dorsal side, and the two sides are silvery with a few longitudinal black stripes. In fresh specimens the silver tint is sometimes mixed with an additional pubescent tinge of yellow giving it a golden appearance. On the ventral side the anterior portion is bright green and posteriorly there are silver dots over a black background. Legs and carapace are light green striped black at the joints. The spinnerets, the claws and the hairs on the legs are black. Chelicerae are brownish yellow.

Argiopidae

Genus *NEPHILA*

Genus *Nephila* includes large-sized forms which are all inhabitants of woods and jungles. Under this genus four species are recognised



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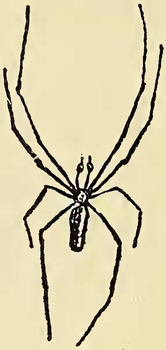

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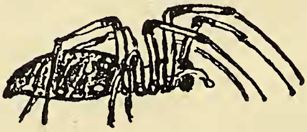

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Fig. 6. *Nephila maculata* (female). Fig. 7. *Nephila maculata* (male). Fig. 8. *Nephila malabarensis* (female).

but one commonly found in western Indian jungles, especially during the rainy months, is *Nephila maculata* or the Giant Wood Spider. The female of this species is verily a giant among spiders, with a body measuring more than 2 inches in length and ¾ inch in breadth. When the legs are stretched fore and aft they cover a length of about 6 to 7 inches. The abdomen is an elongate, truncated cone, black in colour variegated by longitudinal yellow stripes on the dorsal side and yellow or orange patches on the ventral side. The spinnerets are prominent and form a brown rosette. Above this rosette a deep red dot is present. Legs are also black decorated with yellow dots at the joints. Mandibles are brownish black or reddish. Males are insignificantly small and dull coloured. In no other group of spiders is the disparity in size between the sexes so greatly marked. The web of the female is a giant wheel with a hub, radii and spirals, mathematically woven within strong boundary lines attached between trees. The spider generally sits in the centre of the web. To catch a *Nephila* is not very difficult. With a long hook pull the web and down comes the spider. Being a slow runner it can be seized in the folds of a kerchief and dropped into the spirit jar. Regarding the mating and other habits of *N. maculata* readers are advised to refer to the beautiful and elaborate account given by Col. R. W. Hingston in the pages of the Society's *Journal* (Vols. 28 and 29).

N. malabarensis Walck. is common in Malabar but rare in Bombay. This species in general appearance and structure (see fig. 8) stands between *N. maculata* and *Araneus*. The total length of this species is only 25 mm. The abdomen is oval with orange or yellow dots. Spinnerets stout and black and carapace is slightly raised and reddish in colour. Sternum V-shaped and yellow. Legs—femur and tibia yellowish, tarsi blackish covered with fine hairs, joints striped black and brown. The first pair of legs about four times as long as the carapace whereas in the case of *N. maculata* it is about six times as long. Members construct expansive orb-webs obliquely suspended at the angles of tree-branches or on the exterior angles of country-houses. Like *Araneus*, during daytime they remain concealed but at dusk come out to the centre of the web. The webs are permanent structures not renewed every night as in the case of *Araneus*.

Genus *ARGIOPE*

The most important genus under Argiopidae is *Argiope* which gives its name to the whole family. Some eight species are recorded from India and they differ little in their habits. They are found in large numbers soon after the rainy season, sitting in the centre of their splendid orb-webs head downwards (fig. 9). The webs are vertically suspended over fences and vegetation. The spider stretches its legs in the form of a letter X along four rays of the web. At least two of these rays are ornamented with flossy zig-zag bands. The size and shape of the abdomen and the colour design on it vary with different species although as a rule in all cases the abdomen can be described as truncate in front and tuberculated at the sides posteriorly.

In *A. pulchella*, which is the commonest species met with in Bombay, the abdomen is pentangular and banded alternately with brown and yellow. In *A. catenulata* the abdomen is truncate oval and ornamented with round spots instead of bands.

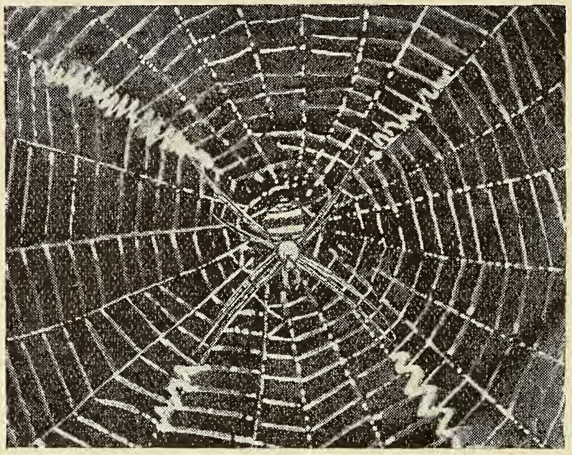

Fig. 9. *Argiope pulchella* and its web.

It appears that the colours of *Argiope* have a definite warning significance as these spiders are seldom found pecked at by birds. Once I noticed a king-crow pecking at the white zig-zag silk arranged along the radii of the web, probably mistaking it for one of the legs of the spider. After this act, I found the bird looking disappointed and morose and cleaning its beak several times against a tree trunk for about five minutes. The sticky threads must have caused this discomfort and the bird did never make a further attempt to catch the spider.[1]

The male *Argiope* is considerably smaller than the female and is of a uniform brown colour. One or two males are often seen in the centre of their small webs built along the upper outskirts of the female web.

The cocoon of an *Argiope* is somewhat pentagonal in shape and slightly yellowish in colour. It is generally attached to the upper side of the web. It takes about three weeks for the eggs to hatch.

Genus *CYRTOPHORA*

The commonest genus of Agriopidae, and that which is most abundant on trees and vegetation, seems to be *Cyrtophora*. This genus is closely allied to *Araneus*, (and has been grouped under *Araneus* by Pocock), but differs from the latter in some structural details and habits. *Araneus*, as a rule, has a round or oval abdomen and legs normal and strong. In *Cyrtophora* the abdomen is longer than wide and provided with four tubercles on the back. The abdomen is beautifully decorated with silver markings on a greenish black background, and slightly produced beyond the spinnerets. The legs are thinner and longer than in the case of *Araneus* and, further, they are coloured green. *Araneus* is nocturnal in habits and its snare is a plain orb-web woven afresh every evening and destroyed early in the morning. *Cyrtophora*, on the other hand, is diurnal and its web is a complicated structure of a permanent nature.

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[1] But it could be that this king-crow was only collecting cobwebs for draping the exterior of its nest!—**Eds.**

Although two or three species of *Cyrtophora* are recorded, *C. ciccatrosa* (fig. 10) is the commonest of them all. Members of this species are of gregarious habits, i.e. several of them build their webs in the same place, each member with its individual web remaining a separate entity. The web of *C. ciccatrosa* can be described as a perfect dome of fine mesh-work suspended horizontally in the midst of a clumsy, irregular tangle of supporting threads. The irregular threads are woven first and over these the radii of the orb are built and then the spirals. From time to time inter-radials and inter-spirals are laid which account for the fine and closely woven appearance of the web. The work of raising the centre of the web is done before the completion of the spirals. Cyrtophoran webs are described by Dr. Gravely thus :

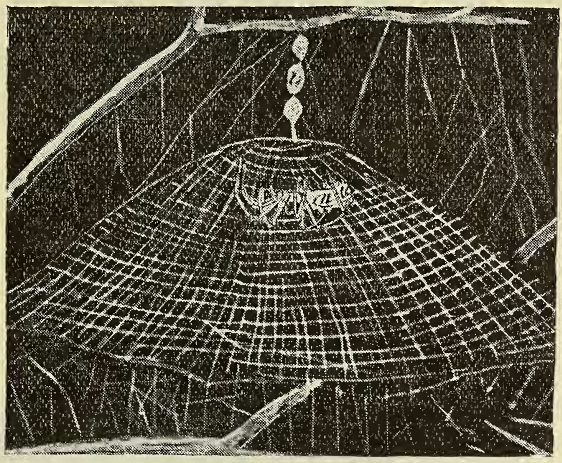

FIG. 10. *Cyrtophora ciccatrosa* and its web.

> 'Members of the genus *Cyrtophora* are remarkable for the extreme complexity of their webs which are probably more elaborate than those of any other spider. Instead of all the radial strands extending outwards from the hub, with interspaces consequently much wider near the periphery than near the centre, additional strands are inserted so as to produce a web of exceedingly fine and uniform mesh. Nor is this all, for these webs are supported in a horizontal position by an extensive network with the help of which the centre of the circle is more or less greatly raised above the periphery, thus forming a sort of tent or dome.'

The spider remains at the centre of the dome in an inverted position. The cocoons are egg-shaped. Eggs are laid in a small silk sheet somewhat greenish in colour, about an inch long and ½ inch wide. The sheet is rolled in the form of an oval cocoon and suspended vertically right above the centre of the dome. Sometimes several cocoons are noticed serially suspended one above the other, but these do not belong to one and the same spider. The lowest one is the property of the spider living in the central web. Each of the other cocoons is owned by the other individuals living in separate webs by the side of the central web. Why the other spiders should deposit their cocoons in the same place where the first spider has placed hers, baffles imagination. This instinct of *Cyrtophora* does not appear to have been satisfactorily explained, and forms a suitable subject for closer observation and study.

Genus *CYCLOSA*

Genus *Cyclosa* includes several small species measuring ½ inch and less in length with colour varying from jet black to fine silver. They have all the characteristics of typical Argiopids but can be distinguished by the raised nature of the caput separated by a groove, the two or more prominences on the abdomen and a line of debris arranged diametrically across their vertically suspended orbs (figs. 11 and 12). Their webs are common in bushes, sometimes

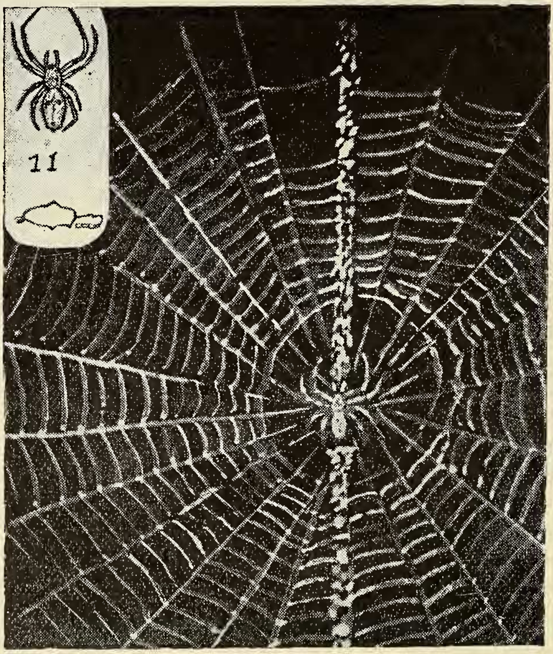

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Fig. 11. *Cyclosa confraga* (above). *Cyclosa confraga* profile (below).
Fig. 12. *Cyclosa confraga* and its web.

near the webs of other spiders. In Malabar their webs are a common feature among the foliage of mango trees.

Genus *ARANEUS*

'The immense genus *Araneus* (=*Epeira*) includes many common forms for the most part more or less nocturnal and having the same general form and coloration as the common European garden spider of the same genus.' The colour is often variable, the structure of the vulva affording the safest means of identification. Members are common among plants and herbs. The best time to collect them is at dusk when they come out to spin their webs. With sunrise they dismantle the radials and spirals and keep a few radials, the hub and the boundary lines alone intact. I have several times noticed *Araneus* eating their webs and on having referred this matter to the Zoological Survey of India received some useful comments which I reproduce below:—

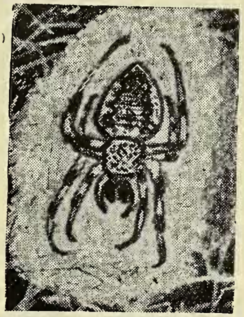

FIG. 13. *Araneus bilunifer* over its cocoon

> 'Comstock in his paper on "Evolution of the webs of spiders" (*Annals of Ent. Soc. of America*, Vol. v, p. 9) observes that in certain members of Argiopidae the entire orb is replaced frequently only the outer foundation lines being a permanent investment. He, however, does not explain why the spiders should break up their webs. Hingston in his "A Naturalist in Himalaya" says that he observed Epeirid spiders eat their own snares; while doing so they swallowed all the minute insects which had got entangled in the webs but were apparently too minute to attract the attention of the spiders at the time of their entanglement.'

During daytime *Araneus* remains concealed in a crevice, curled-up leaf or a special shelter built by it near its orb-web. The cocoon is white and flat, and generally placed near its hiding place. The mother invariably sits over its cocoon presumably to keep it warm and as a protection.

Genus *HERENNIA*

Herennia is another arboreal genus distinguished by the flat pentagonal abdomen with sharply defined lateral edges. *H. ornatissima* is the common species found in Malabar. It is a beautiful spider like Argiope. The abdomen is yellowish, ornamented with black spots. The carapace is blackish with yellowish margin. Legs are long and yellowish. Its orb-web is generally spun close to tree-trunks.

Genus *ORDGARIUS*

Members of this genus have habits similar to those of the above or *Argiope*. The abdomen in this case is very prominent with a large protuberance on either side. The carapace is convex, armed above with a few symmetrically placed tooth-like tubercles. Two species have been recorded: *O. hobsoni* and *O. sexspinosus*. In the former the posterior end of the abdomen is rounded and in the latter it is tubercular and conically produced.

Genus *GASTERACANTHA*

Genus *Gasteracantha* includes medium-sized spiders easily recognised by their peculiarly-shaped abdomen covered with hard integument, and comparatively short legs. Abdomen varies in shape, and the hard integument is drawn into spines of varying sizes in the different species. Some ten species of *Gasteracantha* are recorded, and in habits they all agree with each other. *G. brevispina* (fig. 16), *G. remifera* (fig. 14) and *G. arcuata* (fig. 15) are very common in Malabar. They build their small orb-webs in a vertical plane among low plants and sit in them throughout the day. The spines of *G. arcuata* and *G. remifera* are exceptionally long. Their dull colour and the long spines and integument protect these spiders from their enemies.

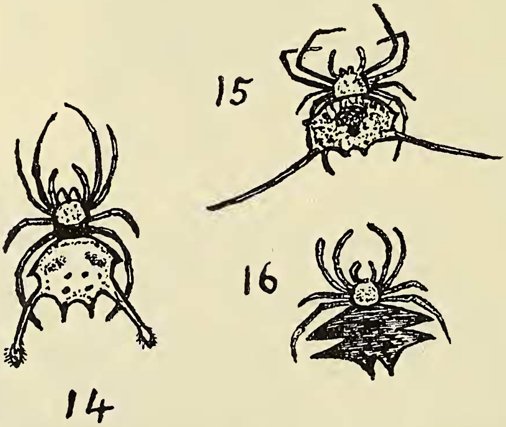

FIG. 14. *Gasteracantha remifera*. FIG. 15 *Gasteracantha arcuata*.
FIG. 16. *Gasteracantha brevispina*.

Based on the above study of the characters and habits of Tetragnathidae and Argiopidae, the following general remarks can be made:—

1. The vast majority of the genera are arboreal and moisture-loving. Naturally they abound in vegetation growing by the side of lakes, rivers, tanks and wells. Their population shows a definite increase soon after the dreary monsoon months.

'When the flowers of the field awake in spring and carpet our woods and downs with their beauty the little folk of spiderland awake with them, true children of the sunlight that they are and the busy round of life begins afresh' (R. A. Ellis).

2. Some genera remain in their webs throughout day and night. Others are nocturnal and come out of their hiding place only at dusk. So mornings and evenings are the best time for collecting these spiders.

3. The diurnal varieties are highly protected either by suitable protective colours matching with the environment, or by bright warning colours, or power of mimicry or by armour and armaments like hard integuments, tubercles and spines. In some cases the webs are also highly protective. When disturbed, dropping to the ground or shamming death are also protective methods noticed among several genera. They are poor runners compared with Hersiliids or Lycosids.

4. Nocturnal species are generally less brightly coloured than the diurnal ones, but have stronger appendages with spines and bristles. When at rest they fold their legs in a peculiar fashion thereby successfully concealing themselves from enemies. Some dismantle their webs during day time.

5. Cocoons are suspended and not carried by the spider. In several genera the eggs hatch in the course of 15 to 30 days after they are laid.

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